INSTRUCTIONS FOR OPERATING THE NRI PROFESSIONAL TUBE TESTER, MODEL 71

The Model 71 NRI Professional Tube Tester is a modern highly flexible emission type test instrument. It uses a Lever-type element distribution system which provides individual circuit control of each tube element. The Model 71 has been designed to afford a maximum of obsolescence-proof facilities.

This instrument is to be operated from ordinary power line voltage: It requires 110-120 volts AC, 50-60 cycles per second. DO NOT use on DC or on AC WITH FREQUENCIES OTHER THAN 50-60 cps. ALWAYS make sure of the kind of power before you plug in this instrument.

Description of the Panel:-

THE METER:- The Model 71 meter has one multi-colored arc. This arc is used for all emission tests (including power rectifiers, Diodes, and diode sections of multi-purpose tubes).

THE SOCKETS:- To the left and right of the meter are the various types of sockets for all tubes to be tested. Select the proper socket to match the basing of the tube to be tested.

The universal tube-cap connector, (at the left of the panel) fits both the small octal size and standard size receiving tube grid caps. The connector MUST be attached to all tubes which have an overhead cap.

THE SELECTOR KNOBS AND LEVER SYSTEM:-

To the right of the meter is a knob labeled "ADJUST LINE" which shuts the instrument off when the knob is fully turned to the left (pointing at "OFF"). This knob also permits you to adjust the voltages within the instrument to compensate for variations in your power line voltage.

Below and to the right of the meter are three red knobs identified as follows:

Knob "B" selects the proper filament voltage for each tube. The proper setting for each type of tube is listed on the roller chart under "B".

The next knob "C" adjusts the sensitivity of the meter. The setting of this control for each type of tube is listed on the roller chart under "C".

The last knob labeled "D", selects the proper emission test voltage and load. This setting is listed on the roller chart under "D".

Each of the 10 numbered levers (below and to the left of the meter) correspond to the EIA numbered base pins of the tube to be tested.

The position of these levers, labeled "A", "OPEN", "TEST" and "COMMON", correspond to the following test circuits in the tester:-

"A" - (Filament Return). Any lever thrown to "A" position throws its corresponding tube element to one connection of the transformer's filament winding. It is therefore obvious that only a filament pin of a tube would be thrown to position "A". The roller chart lists the proper lever number under "A" over the roller chart window.

"OPEN" - (Open circuit position). Any lever thrown to "OPEN" position open-circuits its corresponding tube element. A specific note will appear on the roller chart whenever a lever must be thrown to "OPEN" position.

"TEST" position (Short/leakage, and emission tests). Any lever thrown to "TEST" position (WITHOUT DEPRESSING THE WHITE "READ METER" BUTTON) checks its corresponding tube element for shorts, or leakage. This test uses the neon bulb as the short/leakage indicator. This "TEST" row becomes the emission test row WHEN THE WHITE "READ METER" BUTTON IS DEPRESSED. The roller chart lists the lever numbers under "TEST" on the roller chart.

"COMMON" position. This position is the equivalent of a "ground" position wherein all levers thrown to or left in this "COMMON" position connects corresponding tube elements to the Cathode or "ground" circuit of the tester. All levers which do not have specific roller chart settings are automatically left in this "COMMON" position during test. After the test of a tube has been completed, ALL LEVERS are returned back to the "COMMON" position before the tube is removed.

The "SHORTS" neon bulb, to the left of the lever switches, reveals filament continuity, shorts, and leakages by an orange glow.

The "READ METER" button to the right of the meter is pressed for all emission readings. The triple-window high speed roller chart is moved by spinning the geared wheel at the lower right corner of the panel.

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Observe the following CAUTIONS carefully:

(1) Read this instruction booklet in detail before attempting to test tubes.

(2) ALWAYS be sure that ALL LEVERS are in the "COMMON" position before inserting a tube.

OPERATING INSTRUCTIONS

A. TEST PROCEDURE

1. Connect Line plug to 110-125 volts 50-60 cycles source.
2. Refer to the Roller Chart and set the Lever listed under "A" to the "A" row, and controls "B", "C", and "D" to the positions listed on the roller chart (all levers other than the one thrown to the "A" row remain in the "COMMON" row).
3. Rotate the "ADJUST LINE" control away from the "OFF" position.
4. Insert the tube and allow to HEAT.

   NOTE: Filament Continuity can be checked at this point if so desired as follows:

   > Move the Lever which was just set to the "A" position, down to the "TEST" position and then back to "A". The Neon lamp SHOULD glow when the lever is in the "TEST" position. If no glow is obtained, reject the tube without further test. DISREGARD ANY MOMENTARY NEON LAMP FLASHES AS LEVERS ARE ACTUATED. These flashes are merely the discharge of the blocking condenser in the short check circuit.

5. Rotate the "ADJUST LINE" control until the meter pointer lines up with the "ADJUST LINE" indication.
6. Throw whatever levers are listed under "CATH SHORT" simultaneously to the "TEST" Row and then back to "COMMON". The neon lamp should NOT glow when the levers are in the "TEST" position. If glow is obtained, a cathode short exists, and the tube should be rejected. (The tube should be lightly tapped during this test.)

7. Any lever listed under "Cont" (continuity) should be thrown individually to the "TEST" Row and then back to "COMMON". The neon lamp SHOULD glow when each lever is in the "TEST" position. (Don't forget to return these levers back to "COMMON" position before going on to the next step.)

8. Throw each Lever listed under "TEST" up to "TEST" row, one by one, in the order listed on the roller chart. Watch the neon lamp as each lever is thrown to the "TEST" row. Neon should NOT glow (UNLESS OTHERWISE INDICATED ON THE ROLLER CHART). If a glow is obtained, a shorted element is indicated and the tube should be rejected. (The tube should be lightly tapped during this test). DISREGARD ANY MOMENTARY LAMP FLASHES AS LEVERS ARE ACTUATED. These flashes are merely the discharge of the blocking condenser in the short check circuit.

9. When all indicated levers are up in the "TEST" position, press the "READ METER" button and read Tube Quality on the Meter.

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B. SPECIAL TUBE TEST NOTES

1. OPEN ELEMENT TESTS

Should the Cathode or Control Grid of a tube to be tested be open-circuited within the tube (an unusual occurrence) a "REPLACE" indication will automatically be obtained during the Quality Test. Should the relatively rare condition of an open-circuited Screen or plate, etc., occur, the suspected condition may be ascertained during the Quality test by holding the "READ METER" button down and individually throwing the levers under "TEST" position on the roller chart to "OPEN" position and then back to "TEST" position. If an element is open-circuited, NO movement of the meter pointer will be noted as its corresponding numbered lever is actuated.

2. "EYE TESTS" (electron ray type indicator tubes)

NOTE: For a complete short test on "eye tubes, watch for neon glow on the "TEST" levers same as is done for all other types of tubes.

(a) Single Target Type. This type is typified by types 6E5 and 6G5: For example, a roller chart line for the "eye" section of type 6E5 appears as follows:-

TUBE		A	B	C	D	CATH SHORT	TEST
6E5	EYE	1	8	0	4	-	24

The following test procedure must be employed:- Set all switches and levers as indicated on the roller chart for "eye". Depress the "READ METER" button and observe the circular fluorescent screen which should illuminate completely.

Next, throw the FIRST of the two levers indicated under the "TEST" lever setting (in this example, lever 2) to the "COMMON" position.

A good tube will now exhibit a typical angular shadow. Return the same first lever to its original "TEST" position and note closure of the shadow angle. DISREGARD METER INDICATIONS.

(b) Double Target Type. (Twin electron ray indicator tubes such as 6AD6 and 6AF6): For example, a typical roller chart line for type 6AD6 appears as follows:-

TUBE		A	B	C	D	CATH SHORT	TEST
6AD6	EYE	2	8	0	4	8	3 4 5

Test procedure is as follows:- Set "A", "B", "C", "D" as indicated. Perform "Cath Short" test. Set levers, 3, 4, and 5 to "TEST" row and observe neon bulb for short indications. Depress the "READ METER" button and observe the circular fluorescent screen which should illuminate completely.

Next, throw the FIRST of the three levers under the "TEST" settings (in this example, lever #3) to the "COMMON" position. A good tube will now exhibit a typical angular shadow.

Next, throw the SECOND of the three levers under the "TEST" settings (in this example, lever #4) to the "COMMON" position. The tube, if good, will exhibit another angular shadow opposite the position occupied by the first shadow. DISREGARD THE METER INDICATIONS.

(c) FM/AM Eye Tests (Tuning indicator tubes). This type of electron ray tube is typified by type 6AL7 and is tested simply and positively through virtue of the flexibility of the Model 71.

Test procedure is as follows:- Set all levers and switches as indicated on the Roller Chart. Depress the "READ METER" button and observe the two rectangular fluorescent patterns on the screen of the tube.

With the "READ METER" button depressed, throw the FIRST lever listed in the parenthesis from its "A" position to "OPEN" position. One rectangular pattern should become slightly shorter in length.

Next, throw the SECOND lever listed in the parenthesis from its "A" position to "OPEN" position. The other rectangular pattern should become shorter in length.

Next, throw the THIRD lever listed in the parenthesis from its "A" position to "OPEN" position. BOTH ends of the pattern (opposite to the ends noted above) should then slightly decrease in length. (Observe these ends closely as the movement may be slight.)

3. SPECIAL RECTIFIER TEST (types 70A7, 117N7 and 117P7)

Because of unusual internal connections (plate ties to one side of filament) the 70A7, 117N7 and 117P7 RECTIFIER sections require slightly special test procedures.

70A7 - RECTIFIER SECTION. Set all controls and lever 2 in accordance with the roller chart. AFTER THE TUBE HAS HEATED SUFFICIENTLY, throw BOTH levers 2 and 7 rapidly to "OPEN" position and then lever 6 rapidly to "TEST" position, then quickly depress the "READ METER" button. The first meter deflection obtained is the significant reading, inasmuch as the meter reading will quickly recede coincidental with cooling of the heater.

117N7 and 117P7 - RECTIFIER SECTION. Set all controls and lever 2 in accordance with the roller chart. All levers, with the exception of lever 2, must be in "COMMON" position. AFTER THE TUBE HAS HEATED SUFFICIENTLY, throw lever 2 rapidly to "OPEN" position and lever 7 rapidly to "TEST" position, then quickly depress the "READ METER" button. The first meter deflection obtained is the significant reading, inasmuch as the meter reading will quickly recede coincidental with cooling of the heater.

4. TUBES WITH AN ELEMENT (OR ELEMENTS) WHICH TERMINATE IN MORE THAN 1 PIN

Pin numbers listed under the "Cont" column on the roller chart must show short (continuity) when the corresponding lever is thrown to "TEST" position. For normal usage any tube which does not show short on the designated levers should be considered a defective tube, however, some of these tubes may be salvaged:- For example . . . . .

(a) Tubes with the negative filament connection terminating in 2 base pins. Should one of the two base pin connections become open, the tube may be salvaged and the remaining pin may be used for negative filament termination only if the radio or electronic circuit will allow the use of that pin or BOTH.

(b) Tubes with an element, such as plate, grid, etc., terminating at two or more base pins. Again, if one terminating pin remains connected to the element, the tube may be salvaged if the electronic circuit will allow the use of that pin and does not require the use of the open-circuited base pin or BOTH.

5. GAS TYPE RECTIFIERS OY4, OZ3 and OZ4

When testing these gas rectifier types, it will be noted that the meter pointer will remain, for a short interval, in the "REPLACE" sector and then deflect rapidly into the "GOOD" sector. This condition is normal for a good gas rectifier. However, should the meter pointer remain constantly in the "REPLACE" sector (after the lapse of several seconds), then the gas rectifier should be rejected.

6. PILOT LAMP TESTS

The miniature base socket, located in the center of the combination seven prong tube socket, accommodates all miniature screw and bayonet base type pilot lamps, Christmas tree bulbs, etc. Test procedure is as follows:-

(a) Select proper filament voltage by setting Switch "B" to one of the following applicable voltages:-

VOLTS	"B" POS.
.69	1
1.5	2
2.0	3
2.5	4
3.3	5
4.2	6
6.0	7
6.3	8
7.5	9

VOLTS	"B" POS.
10	10
12.6	11
18.5	12
25	13
30	14
50	15
70	16
110	17

(b) Set Lever #1 to position "A"; turn instrument "ON"; adjust for "LINE"; insert bulb. NOTE: LEVER SWITCHES 2 THROUGH 0 MUST BE IN "COMMON" POSITION.

SUPPLEMENTAL TUBE TEST DATA INCLUDED WITH YOUR INSTRUMENT:

Mechanical design of the roller chart in the Model 71 physically limits the number of tubes which can be listed on the chart. Also, the elimination of seldom-tested tube types from the roller chart itself means faster and more efficient operation of the instrument. Therefore, we have included a separate supplemental list of seldom-tested tubes which you may use as needed when testing these less common types.

NOTE: Three pressure sensitive labels are supplied with your Model 71. Attach these labels in the small rectangular black pads below each Roller Chart window cut-out. You may then print the tube numbers which appear at the bottom of each column on these small labels. The use of these labels will permit you to more easily determine whether or not a tube will appear at the bottom of one column or at the top section of another column.

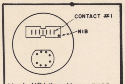
ACCESSORY ADAPTERS AVAILABLE FOR YOUR TUBE TESTER

SUB-MINIATURE TUBE TESTS: The sub-miniature type of electronic tubes employ closely spaced thin wire leads for element termination in contrast to standard rigid pin basings. In addition, two bulb shapes are in production: The ROUND type with lead terminations arranged circularly, and the FLAT type with lead terminations arranged in a straight line.

To accommodate the sub-miniature tubes, NRI offers a simple, economical adapter which terminates in two sockets (ROUND and RECTANGULAR) to permit easy test of these tubes. SEE FIG. 1.

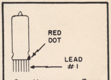
The ROUND type of sub-miniature tube is keyed in the same manner as the miniature 7 pin type, which makes for simple identification for insertion in the socket.

The FLAT type of tube is keyed by a red dot at one corner. The leads read in sequence from that corner, with lead #1 being the lead nearest the red dot. The socket is keyed by a dot (or nib) on the top surface of the socket. The socket contact nearest this nib is contact #1. SEE FIGS. 1 & 2.



No.1 NRI Sub-Miniature Adapter

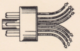
FIG. 1



Sub-Miniature Tube Flat Type

FIG. 2

The Number 1 NRI Sub-Miniature Socket Adapter is available as an optional item at the Net Price of $2.50 Post-Paid.

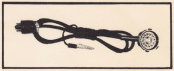


No. 2 NRI Sub-Miniature Flexible Lead Adapter

FIG. 3

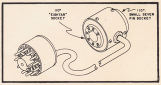
In addition to the sub-miniature tubes made for use with sockets (as described above), there are also special types with long flexible leads which are soldered directly into their respective operating circuits, with the leads cut to varying lengths. In the event a tube of this type has to be removed from its circuit for test, the operator may find it difficult to insert the tube leads into a test socket. Because of this, NRI offers a simple universal sub-miniature tube test adapter with flexible leads and miniature contact clips. This special adapter permits test regardless of lead length variations. SEE FIG. 3. The Number 2 NRI Sub-Miniature Flexible Lead Adapter is available as an optional item at the Net Price of $1.00 Post-Paid.

TV PICTURE TUBE ADAPTER: Enables you to test a Television picture tube in a receiver, or in the original factory carton. The test includes a cathode emission check, and a check for shorts between the various elements in the tube.



The Picture Tube Adapter is available as an optional item at the Net Price of $4.98 Post-Paid.

110° Picture Tube Socket Adapter. This Adapter plugs into the "TV Picture Tube Adapter" listed above and thereby permits tests of the new 110° "Eightar" and "Small Seven Pin" picture tubes.



The NRI 110° Adapter is available as an optional item at the net price of $4.75 Post-Paid.

WARRANTY

Your tube tester carries a standard 90 day RETMA warranty. Write to NRI in case of any trouble. Give complete details. Do not return instrument to NRI without our authorization.

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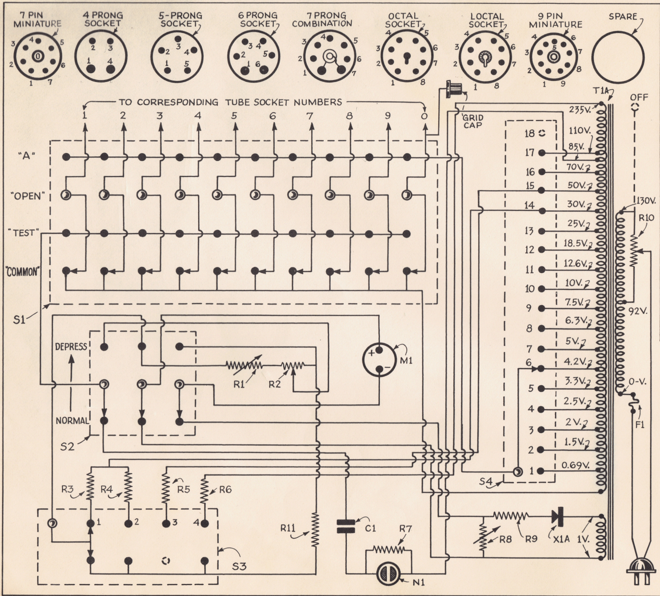

PART NO.	SPECIFICATION
C1	.047-MFD. 200V.
F1	1 AMP. FUSE
M1	1 MA. 160MV. 160-Ω
N1	NE2 NEON LAMP
R1	0-40-Ω
R2	300-Ω CONTROL "C"
R3	200-Ω
R4	1K-Ω
R5	5K-Ω
R6	2K-Ω
R7	1.8 MEG.-Ω
R8	0-40-Ω
R9	50-Ω (APPROX.)
R10	300-Ω LINE ADJUST
R11	40-Ω
S1	LEVER SWITCH
S2	READ METER SWITCH
S3	LOAD SWITCH "D"
S4	FILAMENT SWITCH "B"
T1A	POWER TRANSFORMER
X1A	METER RECTIFIER

NRI
PROFESSIONAL
MODEL 71
TUBE TESTER
SCHEMATIC